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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/456,567	12/08/1999	ANDRE J. VAN SCHYNDEL	91436-188	6619

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EXAMINER	
LEE, BENJAMIN C	
ART UNIT	**PAPER NUMBER**
2632	

DATE MAILED: 04/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/456,567	VAN SCHYNDEL ET AL.	
	Examiner	Art Unit	
	Benjamin C. Lee	2632	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-30 and 32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-30 and 32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. **Claims 1-2, 15-16 and 32** are rejected under 35 U.S.C. 103(a) as being unpatentable over Weckenmann et al. (US pat. #4,016,490) in view of Thomas et al. (US pat. #6,326,227).

1) In considering claim 1:

a) Weckenmann et al. discloses a transmit-receive type electric field proximity detector (Fig. 1) suitable for detecting partially conductive or conductive objects (21), said detector comprising: a transmitting electrode (11); a receiving electrode (13); and at least one ground electrode (12), arranged and sized such that, upon the approach of an object, a signal received by said receiving electrode decreases, ***at least*** until said object is within a threshold distance of one of said electrodes (col. 4, lines 7-37, whereby while Weckenmann et al. did not explicitly indicate what happens when the object is too close, i.e. within the threshold distance, a broad interpretation of the claimed language of "at least.." can disregard such limitation when it is broadly interpreted as the "at most.." condition; furthermore, that by similarity between the sensor structure of Weckenmann et al. as compared to the claimed and disclosed structure, that such threshold behavior would have been inherent);

except:

b) specifying that the proximity detector is "**suitable**" for such objects regardless of their impedance to circuit ground.

While Weckenmann et al. indicated that the detector works with objects (21) that are disclosed to be electrically grounded fingers, Thomas et al. teaches that fingers are sometimes ungrounded objects (col. 3, line 35).

In view of the teachings by Weckenmann et al. and Thomas et al., it would have been obvious to one of ordinary skill in the art at the time of the claimed invention that since fingers can be grounded, or ungrounded as taught by Thomas et al., that a detector such as taught by Weckenmann et al. would have encountered grounded fingers at some times and ungrounded fingers at other times.

Furthermore, since the functionality of such a detector, as well as the arrangement and size relationship of its electrodes 11-13 (see Fig. 1 of Weckenmann et al.) meet the criteria of Applicant's disclosed arrangement and size relationship of the electrodes in the detector, when grounded object 21 approaches the detector, some electric field from the transmitter electrode 11 is directed towards the object to ground thereby reducing the signal at the receiving electrode 13 for detection; on the other hand, if an ungrounded object were to approach the detector, some electric field from the transmitter electrode 11 would be capacitively coupled to the object and back to the detector at the ground electrode 12 since it is the path of least resistance, thereby also reducing the signal at the receiving electrode 13 to be detected.

2) In considering claim 2, Weckenmann et al. and Thomas et al. made obvious all of the claimed subject matter as in claim 1, including:

--the claimed signal generator (14 of Weckenmann et al.) electrically coupled to the transmitting electrode.

3) In considering claim 15, Weckenmann et al. and Thomas et al. made obvious all of the claimed subject matter as in claim 1, wherein:

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention that the threshold distance in a device such as taught by Weckenmann et al. is dependent on various parameters and tolerances including the signals used, the materials, dimension and spacing of the electrodes, etc. and can be chosen to implement an intended effective detection range or sensitivity of the device as defined by the threshold distance, which can include about 10 mm based on particular intended application of the device.

4) In considering claim 16, Weckenmann et al. and Thomas et al. made obvious all of the claimed subject matter as in the consideration of claim 1, wherein:

The claimed behavior of the effective impedance between the receiving electrode and the at least one circuit ground electrode being decreasing more quickly than the sum of the impedance between the receiver electrode and the at least one circuit ground electrode and the impedance between the transmitting and receiving electrodes, at least until the object is within a threshold distance, is inherent of the device of Weckenmann et al. and Thomas et al. by virtue of its construction/configuration, function and operation.

5) In considering claim 32, Weckenmann et al. and Thomas et al. made obvious all of the claimed subject matter as in the consideration of claim 1, wherein:

The claimed behavior of the capacitance between the approaching object and circuit ground electrode being increasing more quickly than the product of the capacitance between the

object and the transmitting electrode and the capacitance between the object and the receiving electrode, at least until the object is within a threshold distance, is inherent of the device of Weckenmann et al. and Thomas et al. by virtue of its construction/configuration, function and operation.

3. **Claim 3** is rejected under 35 U.S.C. 103(a) as being unpatentable over Weckenmann et al. in view of Thomas et al. and Steinmann (US pat. #3,826,979).

1) In considering claim 3, Weckenmann et al. and Thomas et al. made obvious all of the claimed subject matter as in claim 2, except:

--the claimed said signal generator is a low frequency oscillator.

While Weckenmann et al. discloses use of a "high" frequency oscillator 14 without specifying the actual frequency used, it also referred to the oscillator frequency of Steinmann, which is in the low KHz range, as being a "high" frequency (see col. 1, lines 20-25 of Weckenmann et al. and col. 2, lines 20-21 of Steinmann). In view of the disclosure of Weckenmann et al., Thomas et al. and Steinmann, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention that that the signal generator in the device taught by Weckenmann et al. and Thomas et la. is actually a low frequency oscillator, as Steinmann indicated the use of frequency in the low kilohertz range.

4. **Claims 4-14 and 17-30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Weckenmann et al. in view of Thomas et al. and Kithil et al. (US pat. #3,826,979).

1) In considering claims 4-5, Weckenmann et al. and Thomas et al. made obvious all of the claimed subject matter as in claim 1, except:

--the claimed circular concentric and planar arrangement of the transmitting and receiving electrodes with a central circular disk, wherein said ground electrode is generally circular annular ring of conductive material interposed between and coplanar with the transmitting and receiving electrodes.

While Weckenmann et al. shows a circular and planar arrangement of the electrodes (2) but not in a concentric manner, it also teaches that various changes and modifications may be made including any desired shape of the sensor without changing the scope of the invention (col. 5, lines 20-27). Furthermore, Kithil et al. teaches that a capacitive proximity sensor can be implemented in such a concentric and planar arrangement (Fig. 21).

In view of the teachings by Weckenmann et al., Thomas et al. and Kithil et al., it would have been obvious to one of ordinary skill in the art at the time of the claimed invention that a known physical arrangement of the capacitive electrode arrangement such as taught by Kithil et al. can be used in a capacitive proximity sensor of Weckenmann et al. and Thomas et al. to enable proximity detection from various object approach directions while minimizing the device dimensions for convenient placement, whereby when so concentrically arranged, the resulting ground electrode would be a generally circular annular ring of conductive material interposed between and coplanar with the transmitting and receiving electrodes.

2) In considering claims 6-7, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 5, except:

--the claimed second ground electrode of conductive plate having an extend at least equal to an extent of the other of said transmitting and receiving electrodes, and being positioned

behind and substantially parallel to the transmitting, receiving and first ground electrodes, and that the first and second ground electrodes are coupled together.

However, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention that environmental interference due to presence of conductive or capacitive substance or electromagnetic fields from behind the electrodes in a device such as taught by Weckenmann et al., Thomas et al. and Kithil et al. may negatively effect the performance and operation of the device as intended, and that a second ground electrode of conductive plate having an extend at least equal to an extent of the other of said transmitting and receiving electrodes, and being positioned behind and substantially parallel to the transmitting, receiving and first ground electrodes can be used to address such possible interference, and whereby ground electrodes can be coupled together to ground so as to save the trouble of constructing separate grounding paths.

3) In considering claim 8, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 7, wherein:

--It would have been obvious to one of ordinary skill in the art at the time of the claimed invention that the first and second ground electrodes are electrically insulated from the transmitting and receiving electrodes in a device such as taught by Weckenmann et al., Thomas et al. and Kithil et al. so as not to short them and so that they can operate properly as intended.

4) In considering claim 9, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 7, wherein:

--It would have been obvious to one of ordinary skill in the art at the time of the claimed invention that in order to maintained the order of having the transmitting electrode followed by

the first ground electrode followed by the receiving electrode when arranging them in a concentric manner in a device such as taught by Weckenmann et al., Thomas et al. and Kithil et al., one out of two possible physical configuration is to use the central circular disk as the transmitting electrode surrounded by a circular annular ring as the receiving electrode, and with an interposing annular ring as the first ground electrode, whereby either of the two configurations can be chosen without unexpected results.

5) In considering claim 10, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 5, wherein:

--Since Fig. 1 of Weckenmann et al. shows similar surface areas for the 3 electrodes, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention that in order to maintained such similar surface areas when using a concentric configuration of the electrodes in Weckenmann et al., Thomas et al. and Kithil et al., the rlative diameter of the disk, relative inner diameter to outer diameter width of the annular ring ground electrode, and relative inner diameter to outer diameter width of the outer most annular ring electrode should be in the ranges as claimed.

6) In considering claim 11, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 8, including:

--the claimed detector circuitry (Fig. 1 of Weckenmann et al.) coupled to said receiving electrode and being responsive to the induced electrical signal therefrom for generating an output signal indicative of the approach of an intruding object.

7) In considering claim 12, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 11, including:

--the claimed said first and second ground electrodes, which have been established to coupled together to ground s considered in claim 7 above, are electrically coupled to circuit ground of said detector circuitry (Fig. 1 of Weckenmann et al. showing electrode 12 grounded at 12a and detector circuitry inclusive to oscillator 14 is also grounded at 14, which grounds are meant as electrically coupled in circuit diagram interpretation).

8) In considering claim 13, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 12, wherein:

It would have been obvious to one of ordinary skill in the art at the time of the claimed invention that the detector circuitry constitutes a source of interference as established in claim 6, and that the second ground electrode should be physically interposed between such interfering detector circuitry and the transmitting and receiving electrodes in a device such as taught by Weckenmann et al., Thomas et al. and Kithil et al. to prevent interference.

9) In considering claim 14, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 13, wherein:

Weckenmann et al. teaches a detector circuitry comprising a signal detector 14, amplifier 16, the input of the signal detector being electrically coupled to the receiving electrode at 13a, the input to the amplifier being electrically coupled to the signal detector output (Fig. 1), except the claimed use of a rectifier whose input is being electrically coupled to the output of the amplifer.

Weckenmann et al. uses the oscillator output that also feeds the transmitting electrode as a threshold for the comparison circuit 15 for comparing with the output from the receiving electrode to determine variations as an object approaches, which is well known for compensating

unstable oscillator outputs or other environmental factor generated deviations. Weckenmann et al. also indicated that the specific detector circuit is not meant as restricting, but is subject to variations, changes and modifications (col. 5, lines 20-25). It would have been obvious to one of ordinary skill in the art at the time of the claimed invention that for applications of the device such as taught by Weckenmann et al., Thomas et al. and Kithil et al. where a steady/stable oscillator signal is used and environmental factors are negligible, the receiving electrode output signal, which is an alternating AC signal as is the oscillator output, can be rectified by a rectifier into a DC amplitude signal for comparison to DC threshold for determination of the diminishing of the signal amplitude as the detection condition for an approaching object.

10) In considering claims 17-18 Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter 16, plus the consideration of claims 4-5.

11) In considering claims 19-20, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 18, plus the consideration of claims 6-7.

12) In considering claim 21, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 20, plus the consideration of claim 8.

13) In considering claim 22, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 21, plus the consideration of claim 9.

14) In considering claim 23, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 18, plus the consideration of claim 10.

15) In considering claims 24-25, Weckenmann et al. and Thomas et al. made obvious all of the claimed subject matter as in claim 1, except:

--the claimed polygonal concentric and planar arrangement of the transmitting and receiving electrodes with a central polygon having polygon outlines, wherein said ground electrode is a polygon having a central aperture of conductive material interposed between and coplanar with the transmitting and receiving electrodes.

While Weckenmann et al. shows a circular and planar arrangement of the electrodes (2) but not in a concentric manner, it also teaches that various changes and modifications may be made including any desired shape of the sensor without changing the scope of the invention (col. 5, lines 20-27). Furthermore, Kithil et al. teaches that a capacitive proximity sensor can be implemented in such a regular polygonal and planar arrangement (Figs. 7-8 showing REGULAR polygonal configuration for both transmitting and receiving electrodes, while Fig. 21 and col. 14, lines 34-42 discloses polygonal shape for sensor with transmitting and receiving electrodes with in-between grounded gap).

In view of the teachings by Weckenmann et al., Thomas et al. and Kithil et al., it would have been obvious to one of ordinary skill in the art at the time of the claimed invention that a known physical arrangement of the capacitive electrode arrangement such as taught by Kithil et al. can be used in a capacitive proximity sensor of Weckenmann et al. and Thomas et al. to enable proximity detection from various object approach directions while minimizing the device dimensions for convenient placement, whereby when so concentrically arranged, the resulting regular polygonal ground electrode would be a generally regular polygonal ring of conductive material interposed between and coplanar with the regular polygonal and concentric transmitting and receiving electrodes and having the first to fifth regular polygonal outlines.

16) In considering claims 26-28, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 25, except:

--the claimed second ground electrode of a fourth conductive plate having a sixth polygonal outline with an extend at least equal to an extent of the other of said transmitting and receiving electrodes, and being positioned behind and substantially parallel to the transmitting, receiving and first ground electrodes, and that the first and second ground electrodes are coupled together.

However, it would have been obvious to one of ordinary skill in the art at the time of the claimed invention that environmental interference due to presence of conductive or capacitive substance or electromagnetic fields from behind the electrodes in a device such as taught by Weckenmann et al., Thomas et al. and Kithil et al. may negatively effect the performance and operation of the device as intended, and that a second ground electrode of conductive plate having a similar external shape and extend to an extent of the other of said transmitting and receiving electrodes, and being positioned behind and substantially parallel to the transmitting, receiving and first ground electrodes can be used to address such possible interference, and whereby ground electrodes can be coupled together to ground so as to save the trouble of constructing separate grounding paths.

17) In considering claim 29, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 28, plus the consideration of claim 8.

18) In considering claim 30, Weckenmann et al., Thomas et al. and Kithil et al. made obvious all of the claimed subject matter as in claim 29, wherein:

--It would have been obvious to one of ordinary skill in the art at the time of the claimed invention that in order to maintained the order of having the transmitting electrode followed by the first ground electrode followed by the receiving electrode when arranging them in a concentric regular polygonal manner in a device such as taught by Weckenmann et al., Thomas et al. and Kithil et al., one out of two possible physical configurations is to use said central first plate as the transmitting electrode, and the surrounding, apertured second plate as the receiving electrode, whereby either of the two configurations can be chosen without unexpected results.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

US pat. Nos. 5337353, 6025726, 6051981, 5491423, 6348862, 5973318, 6275146, 5986549:

--Similar capacitive proximity sensors using similar electrode structure and/or detection circuitry.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin C. Lee whose telephone number is (703) 306-4223. The examiner can normally be reached on Mon -Fri 11:00Am-7:30Pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Daniel Wu can be reached on (703) 308-6730. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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4/7/04